

Collaboration for Sustainable Intensification: The Underpinning Role of Social Sustainability

Wynne-Jones, Sophie; Hyland, John; Williams, Prysor; Chadwick, Dave

Sociologia Ruralis

DOI:
[10.1111/soru.12275](https://doi.org/10.1111/soru.12275)

Published: 01/01/2020

Peer reviewed version

[Cyswllt i'r cyhoeddiad / Link to publication](#)

Dyfyniad o'r fersiwn a gyhoeddwyd / Citation for published version (APA):

Wynne-Jones, S., Hyland, J., Williams, P., & Chadwick, D. (2020). Collaboration for Sustainable Intensification: The Underpinning Role of Social Sustainability. *Sociologia Ruralis*, 60(1), 58-82. <https://doi.org/10.1111/soru.12275>

Hawliau Cyffredinol / General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Collaboration for Sustainable Intensification: The Underpinning Role of Social

Sustainability

Abstract

Sustainable Intensification (SI) has been popularised in recent years as an approach seeking to balance the potentially conflicting demands of enhancing agricultural outputs, with reducing the negative impacts arising from the current food system. Proponents have argued that SI can benefit from collaboration between farmers, but understanding is limited by a lack of data on current collaborative practices. Questions have also been raised as to whether the SI agenda pays sufficient attention to social sustainability, as part of a fully integrated conception of SI. Tackling these issues, this paper reports on mixed methods data collection from seven case areas across the UK, with a particular focus on the experience of upland livestock farmers in north Wales. We evidence: (1) The extent, forms and preferences associated with farmers' collaboration; with findings demonstrating higher levels of collaboration than anticipated and a preference for informal forms of co-working. (2) The underpinning and mutually reinforcing role of social interconnectedness in the delivery of diverse outcomes from collaboration. (3) How SI is perceived to threaten social sustainability, and thus work against a more integrated model of delivery. The paper concludes by arguing for a genuinely integrative model of SI to secure collaborations going forwards.

1. Introduction

Sustainable Intensification (SI) has been popularised in recent years as an approach seeking to balance the potentially conflicting demands of enhancing agricultural outputs, to ensure food security, with reducing the negative impacts (both environmental and social) arising from the current food system (Garnett et al. 2013; Godfrey and Garnett 2014). Specifically, the paper reports on research undertaken through the Defra Sustainable Intensification Platform (SIP), which defines SI in the following terms:

“SI involves managing farmland to increase farm output and competitiveness, whilst protecting the countryside and enhancing environment and social benefits. ‘Intensification’ of farming should not be confused with ‘intensive’ farming. SI does not assume a shift from less to more intensive modes, or vice versa. Instead, farmland is managed to maximise outcomes across economic, environmental and social dimensions.”ⁱ

Despite enthusiasm for SI amongst proponents from industry and policy circles (FAO 2011; Foresight 2011), many uncertainties and unresolved tensions remain. Much discussion has focused on the extent to which objectives for intensification can be meaningfully combined with requirements for sustainability (Fish et al 2014; Garnett and Godfray 2012; Levidow 2018). Research has also centred on what SI means in particular locales and sectoral contexts (Baulcombe et al. 2009; Scherer et al. 2018), acknowledging that *“sustainable intensification specifies a goal, but not a trajectory”* (Godfrey 2015, p201). Whilst the scalability of SI has been problematised (Gunton et al. 2016), emphasising a need for specificity and local adaptation rather than generalisable approaches (Godfrey 2015), there is increasing acceptance that action at scale, i.e. across multiple farm units, can benefit SI (Prager 2015; Weltin et al. 2018).ⁱⁱ

Environmentally, joined-up landscape-scale action can reduce flood-risk, pollution and nutrient loss, whilst enhancing biosecurity, carbon sequestration and habitat connectivity (Lawton et al. 2010; Prager et al. 2012; Prager 2015; Stallman 2011). In economic terms, group working can enable bulk purchasing and group investments, along with labour/resource sharing and collective marketing (Bijman et al 2012; Bijman and Iliopoulos 2014; Forney and Haberli 2017). Interaction can also improve innovation, supporting uptake of new technology and techniques to enhance efficiencies (Mills et al. 2011; Moschitz et al. 2015; Schneider et al. 2009). Socially, collaborative working has been seen to support farmer wellbeing, due to reduced labour burden and the mental health benefits of reduced isolation and stress (Saxby et al. 2018; Wynne-Jones 2017). It can also provide a mechanism for cultural renewal, enabling continued community viability (Dias and Franco 2018; Spyridakis and Dima 2017).

What we know less about is the current extent and form of collaboration across the sector. Although there is a sizable literature on agricultural collaboration and cooperation *per se* (Bijman et al 2012; Emery et al. 2017), there are limited data on the extent of more informal modes of collaboration across the sector. Existing research primarily targets formalised entities (Bijman and Iliopoulos 2014; Cogeca 2013; Forney and Haberli 2017; Kasabov 2015), case study groups, or uptake of particular initiatives (Franks and Emery 2013; Mills et al. 2011; Westerink et al. 2017), and does not capture the diverse ways in which a broader range of farmers work together. For example, current data does not capture informal modes of mutual aid or resource sharing. Moreover, traditional forms of collaboration are now changing as agricultural and wider rural geographic contexts have altered (Emery 2015; Fonte and Cucco 2017; Forney and Haberli 2017). There is, therefore, a need to understand the most prevalent and acceptable forms of collaborationⁱⁱⁱ for farmers today if we wish to enhance and support these to deliver on SI objectives.

71

72 It is equally critical to consider how the push for SI can either work to support or undermine
73 collaborative practices. As SI is intended to combine environmental, economic and social
74 priorities (Loos et al. 2014; Mahon et al. 2017), we consider the extent to which these facets
75 are mutually supported through collaborative practices on the ground. This point is particularly
76 pertinent in light of critiques that question whether policy pressures for SI are being narrowly
77 interpreted within industry as a return to productivism, at the exclusion of environmental and
78 social priorities (Fish et al. 2014; Garnett and Godfrey 2012; Godfrey 2015; Levidow 2018).
79 Recent analyses have particularly underlined the absence of a meaningful social agenda within
80 SI advocacy, despite a stated aim to deliver on all three facets of sustainability (Loos et al.
81 2014; Mahon et al. 2017).

82

83 Speaking to these areas of concern, the paper evidences (1) The extent, forms and preferences
84 associated with farmers' collaboration; (2) The underpinning, and mutually reinforcing role of
85 social interconnectedness in the delivery of diverse outcomes from collaboration; (3) How SI
86 is perceived to threaten social sustainability, and thus work against a more genuinely integrated
87 model of delivery. Whilst the research set out to explore the data detailed under point (1) as a
88 core initial objective, findings covered in points (2) and (3) arose inductively through the
89 research process, as we discuss further in section 3.

90

91 The paper reports on mixed-method data collection undertaken in seven case areas across the
92 UK, as detailed in section 3. Data presented includes broad trends across all the areas surveyed
93 for points (1) and (2), but provides particular focus on the perspective of upland livestock
94 farmers in north Wales in the discussion of points (2) and (3) where notable geographic and
95 sector-specific trends and concerns were evidenced. These issues reflect the prevalence of high

environmental land value and lower levels of economic resilience amongst these upland farm businesses, alongside high levels of cultural interdependency with the rural community, which have led to a particular set of challenges in terms of delivering SI.

2. Literature Review

This section provides further insight into the two key issues framing the contribution of the paper, namely (1) the changing patterns of farmer collaboration and potential linkages there in to SI, (2) how collaboration connects with recent calls for a more integrated conception of SI that encompasses social sustainability.

2.1 Changing patterns of collaboration

Whilst collaboration is traditionally a component of many farming systems, to enable labour sharing at periods of seasonal demand, the number of full-time workers on farms has declined markedly with rationalisation and modernisation of the sector^{iv}. Agriculture now employs only 1.42% of the UK's workforce (Armstrong 2016), with farms across Europe increasingly relying on casualised, seasonal and contract labour (EC 2013). Despite being able to make informed judgements drawing on case reporting, there are no national-level data available showing the impacts of these changes on different forms of agricultural collaboration over time.

There is, however, more comprehensive reporting on formalised business cooperatives, which show marked declines. This is not simply due to reduced capacity, but is the result of reforms and mergers within the cooperative sector, coupled with continued competitive pressures, which have radically altered the structure and function of many cooperative entities (Bijamn et al. 2014; Forney and Haberli 2017; Kasabov 2015). This issue appears particularly acute in the UK^v. Comparing data from Cooperatives UK and the Office of National Statistics (ONS 2018)

we see that just under 40% of the agricultural labour force are members of cooperatives, with a gradual decline in recent years^{vi}. Diminishing experience and accompanying cultural shifts towards more individualistic norms and behaviours could further exacerbate these trends (Emery 2015).

However, these data only provide a partial picture. To better understand the potential (or otherwise) for collaboration to support SI, we need a more thoroughgoing analysis of what forms of collaboration farmers are continuing to undertake looking beyond the formalised entities and activities captured in current reporting. It is this research gap that underpins the first component of our data collection, as outlined in section 3, which seeks to include a wider range of activities, connections and co-working, beyond registered groups. Whilst we are informed by existing insights from the literature, presented in section 1, on how SI can benefit from collaboration, the research is intended to get a wider-ranging sense of the collaborative activities farmers are undertaking as a means to assess their general inclination and skills in collaborating per-say.

2.2 Integrated benefits?

Our second area of interest is the extent to which beneficial outcomes from collaboration interconnect (or not), i.e. whether there are synergies between the environmental, economic and social outcomes achieved. This analytical focus was not pre-determined at the start of the research process but emerged inductively. In particular, as we go on to describe in section 4, our data highlights the importance and interconnecting role of social factors and outcomes. These insights were then drawn out and assessed further in light of calls for a more substantively integrated approach to SI (Garnett and Godfrey 2012; Levidow 2018) and

concerns regarding the neglect of a social sustainability agenda within SI forums (Loos et al. 2014; Mahon et al. 2017).

There has been considerable debate over the balance of economic and environmental agendas within SI advocacy, with concerns that SI might justify “*intensification per se and the accelerated adoption of particular forms of high-input or hi-tech agriculture*” (Godfrey 2015, p200) or be “*liable to exploitation by commercial interests that will concentrate on increasing yields and pay little attention to making food production more sustainable*” (ibid p204). This has prompted calls for SI to move beyond the targeting of efficiencies within current system framings towards more fundamental transformations. For example, Rockstrum et al. (2017) argue that SI needs to pursue the enhancement of *all* ecosystem services from agriculture in place of traditional measures of food productivity.

Extending such concerns, Loos et al. (2004) draw attention to the paucity of social considerations within SI advocacy. Specifically, they highlight a lack of focus on issues of justice and equity, both in access to food but also for producers and workers. This includes questions around fair pay, working conditions, labour relations and wellbeing, along with broader concerns regarding the viability of agricultural livelihoods and socio-cultural resilience (Shreck 2006). They also contend that social sustainability pertains to questions around decision-making capacity and control, cautioning against the imposition of measures and approaches (see also Forney 2016; Källström and Ljung 2005). Similarly, Suhardiman et al. (2016) assert the need to attend to farmer’s socio-economic context to ensure the appropriateness of strategies advanced, echoing Loos et al’s (2014) emphasis on regional responsiveness.

Although there has been increased profiling of food waste, poverty and nutrition (Garnett et al. 2013), it is not otherwise clear that a substantive change has occurred in the framing of SI to take account of social sustainability. It is also arguable that current UK policy appears to elide the social concerns of producers, focusing instead on ambitions to align the delivery of environmental and economic outcomes (e.g. Gove 2018; Griffiths 2018; Wynne-Jones and Vetter 2018). This is at a time when the social sustainability of farming is being placed in increasing question across Europe (Beilin et al. 2014; Joosse and Grubbström 2017).

This raises critical questions in terms of how collaboration intersects with social sustainability and a more genuinely integrative model of SI. Does collaboration enable and enhance social sustainability, and visa-versa, and how does this support synergies with the economic and environmental aspects of SI? Whilst there are some insights in the literature on how farmers interpret the balance of environmental and economic agendas in the context of SI advocacy (Fish et al. 2013; Wheeler et. al. 2019), this has not been extended to explore how (or indeed if) social sustainability features. It is here that our data adds new insights.

Within the literature on farmers' collaboration, we see a largely 'siloed' perspective (Emery et al. 2017), where objectives and benefits arising have been discussed as *either* economic (Bijman et al. 2012) *or* environmental (Prager 2015). Whilst social factors, such as trust and social capital, are widely acknowledged as important *facilitators* of collaborative action (Tregear and Cooper 2016) the social *benefits* of collaboration have received less attention, or are treated as a secondary objective (Wynne-Jones 2017). Some recent analyses do acknowledge that collective action can have synergistic benefits, with a combination of outcomes arising in tandem (Emery et al. 2017). However, as these data are primarily derived

from ‘successful’ cooperatives, there is a need for wider analysis to understand how and why a wider array of farmers interact - which our data provides.

3. Methods

Data collection included a structured survey and focus group discussions in seven case areas (detailed below). This was undertaken in 2015 as part of the broader Defra SIP research activities, which encompassed a number of objectives alongside the focus on collaborative activities. Areas of questioning covered by the survey included:

- Characteristics of the farm business
- Changes in the farm business
- Views and practices of sustainable intensification
- Environment and resource management
- Community and quality of life
- Collaboration with others

This paper focuses on the data relating to collaboration. Data collected relating to views and practices of sustainable intensification are covered by Wheeler et al. (2019). This paper does not repeat those findings, which largely pertain to the balance of environmental and economic agendas. Our discussion of concerns surrounding sustainable intensification (in section 4.3) draws, instead, on insights from the north Wales (Conwy) area focus group and additional interview data, which are detailed below.^{vii}

The case areas (location shown in Figure 1), were chosen to reflect the key sectoral and regional geographic variations arising in UK farming (upland and lowland livestock, including beef and sheep, dairy, mixed and arable). Potential participants were recruited from a sample provided

by Defra and Welsh Government, which was stratified to reflect the main farm types and provide good geographical coverage within the different areas. There was a target of 35 interviewees per case area with a final total of 244 respondents.^{viii} See Table 1 for a breakdown of characteristics.

The survey derived both quantitative and qualitative data on farmer attitudes and experiences pertaining to collaboration as summarised below:

- Activities undertaken
- Most important form of cooperation
- Preference for formal/informal
- Reasons for cooperating
- Benefits/difficulties arising
- Factors that enable cooperation
- Involvement in setting up cooperative activities

The survey was conducted face-to-face, with responses audio-recorded to enable full transcription of open-response questions. Forms of collaboration recorded were chosen to reflect a range of current practices across the sector and were not purposely linked to particular SI objectives.^{ix} Our aim here was to understand the current prevalence and preferences associated with farmer collaboration, to determine whether farmers have the willingness, skills and experience-base to enable collaboration per say, as a positive underpinning for SI, and what parameters might constrain or enable collaboration. More refined analysis was then informed by the literature outlined in section 1 regarding our understanding of what forms of collaboration could be connected to particular SI outcomes.

To enable the identification of particular patterns in responses within the data, e.g. by area or farm type, comparisons were made using cross-tabulations for quantitative data. A statistical hypothesis test for independence between paired categorical variables was conducted, using a Chi-square test. An association between variables is labelled as ‘significant’ if the p-value is lower than 0.05. Qualitative data were coded thematically using an inductive approach. Codes were then grouped into broader categories (for example, motivations to collaborate), which could be analysed in relation to participant attributes to determine any commonalities or differences. Further details of coding relevant to particular results discussed is given in section 4.

In addition to the survey, focus groups were undertaken in each case area to provide more open and context rich insights centring on (1) farmers’ reactions to the idea and challenge of sustainable intensification, and (2) their perspectives on farmer collaboration. For both topics a stimulus was provided to initiate discussions.^x Respondents were recruited using the original sample (although avoiding duplication with those surveyed), in conjunction with a list of farmers who had attended events with the partner universities. Between 6 and 13 respondents attended in each area. The resulting data were inductively coded, to draw out unifying themes, and used here to give supplementary insight into how farmers understood the issues in question (Fish 2017). This paper presents material from the Conwy area focus group enabling a more refined discussion on place and sector specific objectives and concerns.

A subsequent round of semi-structured interview data was then collected with an additional eleven farmers in the Conwy area in 2017, who were working together to implement measures that fitted with the objectives of SI detailed in section 1. This included collaboration as a producer group called ‘Fferm Ifan’ to achieve influence in sales negotiations; economies of

scale and innovations from collective equipment purchasing; and implementation of joint environmental measures funded by Welsh Government^{xi} (for further details see Wynne-Jones et al. 2017). Interview questions with this group centred on their motivations and experiences of collaborating for these different ends. Notably points relating to social sustainability emerged from the interviews and other data discussed, rather than being led as part of a deductive enquiry.

Overall, our results and discussion present broad themes across all areas surveyed but focus in on Conwy (as detailed in section 1) due to notable themes arising. To provide further context, the dominant farm type within the Conwy area is upland livestock, with land predominantly being categorised as Less Favoured Area (LFA),^{xii} limiting productive capacity. 86% of Conwy respondents had LFA land and 100% of the Fferm Ifan farmers. This is also the principal land-use and type for Wales (Armstrong 2016). In terms of SI priorities, a strong policy steer has been given on the importance of rewarding environmental outputs into the future (Griffiths 2018). This responds both to the existing environmental value of upland farms but also their vulnerable economic position and limited capacity for intensification when benchmarked against lowland producers (Dwyer 2018). Confirming the economic pressures these farms are under, 47% of Conwy respondents reported their (net) farm income was ‘considerably lower than the national average of £21,500/an’. This is corroborated by national survey data where 38% of Welsh farms made less than £25,000/an (WRO 2010), showing Conwy respondents to be amongst those in the weakest financial position across all the areas surveyed. Demonstrating the high environmental value of farms in the area, 66% of Conwy respondents reported agri-environmental scheme participation and 91% of the Fferm Ifan group.

287

Figure 1 here

288 **Figure 1:** Location of the seven SIP case study areas (reproduced from Morris et al. 2017)

289

290

291

Table 1 here

292

293

4. Findings

To begin we consider the current extent, forms and preferences associated with farmers' collaboration. We then turn to demonstrate the underpinning and mutually reinforcing role of social interconnectedness in the delivery of diverse outcomes from collaboration. Finally, we show how SI is perceived to threaten social sustainability, and thus work against a more genuinely integrated model of delivery

4.1 Collaboration: Extent, form and preferences

High levels of collaboration were reported across all areas, as shown in figure 2. All but six farmers reported that they were collaborating, and all but one in the Conwy area. Notably, the figure for involvement in buyer and producer groups (commonly recorded as forms of formal cooperative) was 36% across all areas, and hence comparable with the national-level data discussed in section 2. This indicates that levels of collaboration across the sector are much higher than formalised reporting indicates once a full range of additional collaborative activities are taken into account.

Alongside buyer and producer groups, the highest levels of participation were noted for trade union membership, machinery and labour sharing, discussion groups and short-term keep of livestock, as shown in figures 2 and 3. All of which would not normally be encompassed in official reporting of collaboration. Although formal records are available for some of these activities, machinery and labour sharing are notable as key activities which fall outside of formalised measures^{xiii}. Labour and machinery sharing were also reported as the most important form of collaboration for a majority of farmers.

Collaborating on environmental management was reported by a lower number of farmers overall but was amongst the most prevalent activities in the Conwy area (no significant relationship was evident). This included both formal collaborations through agri-environment schemes (6 farmers) and activities outside of these formalised schemes (7 farmers).

Critically, collaboration was not restricted to one core activity and farmers were seen to be undertaking multiple forms of collaboration. For example, the majority of respondents in the Conwy area (77%) were undertaking three or more forms of collaborative activity. Qualitative reporting in the Conwy similarly contended that there is more collaboration between farmers than government and external agencies might realise.

Farming is probably the biggest social collaborating group. You can't think of a hundred mechanics meeting every Tuesday [i.e. at the farmers' market] ...
I don't know why they [government] think that we are not cooperating. Maybe we are not cooperating in the ways that they are thinking of. (Conwy Focus Group)

Figure 2 here

Figure 2: Bar chart showing extent and forms of collaboration for all farmers across the seven SIP case areas (modified from Morris et al. 2017).

Figure 3 here

Figure 3: Bar chart showing extent and forms of collaboration in the Conwy area.

In terms of motivations and benefits^{xiv}, respondents reported economic factors, enabling efficiencies and profit maximisation through economies of scale, as the primary driver and most valued outcome from collaboration (shown in table 2). Social factors were, nonetheless, valued very highly and in some cases seen to arise as a more substantive *benefit*, even if not stated as a primary motivation. This was particularly so in the Conwy area where ‘mutual support, neighbourliness and community’ were rated more highly than any other factor as an outcome of collaboration. Knowledge exchange was also notable as an outcome of collaboration, but potentially not anticipated or driving activities at the outset. Again this trend is most marked in the Conwy area (as we expand below). Data on farmers motivations to collaborate show a potentially worrying lack of interest in environmental drivers and particularly so in the Conwy area, although this does not correlate with low levels of environmental activity.

Table 2 here

Finally, it was evident that preferences for *informal* forms of collaboration markedly outweighed those for formal collaboration, at 57% versus 26% respectively (17% had no preference) across all areas. The data for the Conwy echoes this at 60% versus 34% (with 6% expressing no preference). This aligns with, and potentially explains, the high levels of informal collaboration reported above. Further affirming the trend for less formalised collaboration in the Conwy area, our data shows relatively low levels of experience in setting up formal collaborations (less than a quarter of respondents: 8 total) and lower levels than expected here for participation in formalised buying groups ($p < 0.001$). Nonetheless, farmers across all areas did stress that formalised modes of collaboration were preferable for activities involving financial investments, such as buying equipment to share.^{xv}

4.2 The Importance of Social Interconnectedness

The following section outlines the underpinning and mutually reinforcing role of social interconnectedness, particularly in relation informal collaboration but also in the broader delivery of economic and environmental outcomes from formalised approaches.

4.2.1 Social Underpinnings

Across all activities and areas, social factors were perceived as the most important enabler for collaborative working noted by 68% of respondents.^{xvi} This was particularly marked in discussions of informal collaboration encompassing comments on ‘helping each other out’ and the prevalence and enhancement of trusting relations. Critically, trust and strong social bonds were not only seen pre-requisites but something that was nurtured through informal collaborations.

“Informal is good for me... It helps build trust and friendships, because you're helping each other out and you're honouring your informal agreements, which I think has a greater bonding aspect to it in social life.” (SIP Survey respondent 51064 Wensum and Yare)

“Nice to help one another. In the old days it was what's called community spirit. Just neighbourly, neighbourly values. And I think with a lot of farming it's traditional values, like it was 50 years ago.” (Respondent 10001 Taw).

“It takes a lot of time to do these things, but it's quite interesting to be involved... it's very good for the community. I've become much better friends with other people now because of the group.” (Fferm Ifan Farmer 9)

396 In these terms, farming was likened to a more traditional and supportive form of rural
397 community that in other ways is being lost. But, equally, it was stressed that farming can be
398 isolating and otherwise challenging if farmers do not offer such forms of ad hoc support.

399

400 *“...it's good to meet people because it can be a lonely business, farming, unless you've got a*
401 *team of people around you all the time. ...it's supportive...meeting people and learning*
402 *something. So it's the social part of it and networking and making friends.”*

403 *(SIP Survey respondent 72007 Avon)*

404

405 *“Mutual support - if he gets stuck or his vehicle lets him down he can use one of mine and it's*
406 *just dead easy.” (Respondent 51092 Wensum and Yare)*

407

408 Whilst these perceptions were common across all the areas surveyed, there was a marked
409 emphasis upon the strength of community and a sense of conviviality underpinning the farmers'
410 behaviours and attitudes within the Conwy area (as shown in table 2 and outlined above). This
411 was particular evident in respondents' explanations of their preference for informal
412 collaborations:

413

414 *“We don't do formal - we trust and know other farmers. (SIP Survey respondent 20017*
415 *Conwy)”*

416

417 *“I wouldn't ask my friends to sign something if I was making a deal with them. (Respondent*
418 *20032 Conwy)”*

419

420

421 *“Community spirit. We might as well live in the city if we ask for £10 for this and that.”*
422 *(Respondent 20010 Conwy)*

423

424 *“Easier, that's how close farmers are, they work better together informally.” (Respondent*
425 *20024 Conwy)*

426

427 *“No one asks for payments around here.” (Respondent 20003 Conwy)*

428

429 These rationales indicate a high level of interdependence within farming community members,
430 which is supported by the data on levels of farmer-to-farmer contact, with 80% of respondents
431 in the Conwy area being in contact with other farmers once a week or more. Moreover, a third
432 of survey respondents here explicitly noted helping each other out, and/or discussion groups,
433 as important mechanisms for social contact. Wider discussions further confirmed a distinctive
434 social setting within the Conwy area, with 71% of Conwy respondents reporting that farming
435 was ‘essential’ to the local community, and qualitative reporting affirming the sense of farming
436 as both a cultural and socio-economic lynchpin for the area.

437

438 *It's all very communal here. There is a very strong community because obviously, there's that*
439 *many small farms. (Fferm Ifan Farmer 4)*

440

441 *You wouldn't think it but the whole community would collapse without it [farming] as there is*
442 *nothing else. (SIP Survey respondent 20016 Conwy)*

443

444 This is a trend that was echoed across all LFA livestock farmers in the survey, who were
445 statistically more likely to feel this way than other farm types ($p=0.001$). An additional
446 distinction of the Conwy area was the interconnection of farming and the use of the Welsh
447 language, which added another thread tying the community together and strengthening the

sense of dependence on farming for both cultural as well as socio-economic resilience (Agra
CEAS Consulting 2019)

4.2.2 Reinforcing Outcomes

Farmers here held this sense of community in such high regard, that a desire to protect and
strengthen it was articulated as an underpinning motivation for both informal and more
formalised forms of collaboration. This extends insights shared above that social outcomes can
act in a reinforcing cycle, both enabling and arising from collaboration. In particular, the Fferm
Ifan farmers reported this perspective in relation to their activities as a formalised producer
group, collective equipment purchasing, and decisions to participate in a joint environmental
scheme.

*“...with the increase in farm sizes, what I’m trying to say is nobody wants to see anybody go
away. We want to see them all with us here.” (Fferm Ifan Farmer 7)*

*“If you can help in any way you can, you will. That’s why I wanted a farm here and raise my
children here. It’s a good way of life. I think we all feel like that.” (Fferm Ifan Farmer 5)*

What the farmers are outlining here is a desire to work together as a means to assure greater
business viability, as a collective, which for them is indivisibly tied-up with a desire to remain
within, and thus sustain, their home community. Critically, in this case their activities are not
only producing economic benefits and innovations in farm practice, but also underpin decisions
to pursue environmental objectives. In both aspects, they see that can gain greater efficacy and
reward by working as a group.

473

474 *“The group setting is very good for going for the different funding projects because a lot of*
475 *these funds now have a minimum spend...it’s more than a small farm like this can justify but*
476 *together...*

477 *One hedge is not going to make much of a difference, but a couple of hundred is”* (Fferm Ifan
478 Farmer 4)

479

480 This disposition, to engage in collaborate approaches as a means to secure collective gains was
481 similarly explored in the Conwy focus group - *“everybody gains not just you”* - aligning with
482 reporting above on the strength of community sentiment in the area. The discussion here
483 reflects how social underpinnings support a range of outcomes from collaboration, arising from
484 informal labour/machinery sharing through to participation in formalised producer groups and
485 environmental scheme participation. But it also goes further, in evidencing how the social
486 *outcomes* arising are equally valued and feedback back into farmers’ motivations to undertake
487 such activities.

488

489 A final area of interest is the relationship between social connectedness and outcomes for
490 knowledge exchange. This underpins farmers’ ability to adapt their farming practice, making
491 appropriate changes to refine their systems and take-up new schemes to enhance environmental
492 and economic outcomes. As outlined above, the opportunity for knowledge exchange was one
493 of the key benefits acknowledged from collaboration (shown in table 2). This was particularly
494 marked amongst Conwy respondents and related to the prevalence of more informal day-to-
495 day exchanges that seem to constitute a key feature of farming in this area.

496

497 *Always good to have someone looking from the outside in rather than the inside in. You can*
498 *learn more than reading any books or articles. (SIP Survey Respondent 20023 Conwy)*

499

500 *You pick up animal health tips for other farmers when working together (Respondent 20028*
501 *Conwy)*

502

503 *To swap information and try different things out; that's how everything improves isn't it.*
504 *(Respondent 20022 Conwy).*

505

506 This provides further evidence of the interlinkages between strong social relations and
507 outcomes for SI within the Conwy area.

508

509 **4.3 Threats to Social Sustainability**

510 Throughout the previous discussion we have celebrated social sustainability in terms of vibrant
511 communities that are closely connected and interdependent. However, fears around the loss of
512 community in rural areas, connected to a reduction in farm workers and ultimately businesses,
513 are increasingly pressing (Dwyer 2018; McManus et al. 2012). Despite – or perhaps precisely
514 because of - the conviviality noted above, these concerns were particularly noted in the Conwy
515 area. Here changing labour and social dynamics over time were highlighted and questions
516 raised as to whether collaboration was now a lost cause as capacity declined, or whether this
517 was actually the critical time to pursue collaboration.

518

519 *Respondent: There's less people on farms now, so do you think that this is more important than*
520 *ever or actually because we're so busy we haven't got time?*

521 *Another respondent: Use a contractor and the social is gone.*

522 *Another respondent: If someone shouts we'll go and help and that's why...* (Conwy Focus
523 *Group)*

524

525 Whilst the figures shown in section 4.1 suggest that labour and machinery sharing are still
526 practised by just over a third of farmers, there is now an average of only 1.5 full time workers
527 per farm in the Conwy and only 10 out of 35 derived 100% of their income from the farm.
528 Consequently, traditional collective practices of gathering (of sheep on the commons), shearing
529 and hay/silage-making are being replacing by use of contractors, with 98% of respondents in
530 the Conwy using contractors. Nonetheless, these declines in labour availability have not as yet
531 diminished farmers' *willingness* to support each other, even though their capacity to do so is
532 compromised.

533

534 *We are on our own now in a way, and you haven't got the time. But, after saying that, I could*
535 *phone any of my neighbours and they'll come down and help you with any trouble straight*
536 *away. (Fferm Ifan Farmer 8)*

537

538 Caution does, however, need to be exercised in terms of how much we can expect farmers to
539 rely on often ad hoc forms of collaboration as a means of making their businesses viable.
540 Moreover, the time pressures noted also impact on the extent to which farmers are able to
541 interact in ways that can promote knowledge exchange and innovation.

542

543 Perhaps more worryingly, the Conwy farmers saw SI as potentially exacerbating rather than
544 reducing such trends, with SI associated with pressures to become more competitive, which
545 was then seen to undermine the underpinning social fabric. In particular, focus group
546 discussions highlighted a perceived contradiction between SI requiring more collaboration but

547 also greater competition, with farmers expressing frustration at the conflicting agendas and
548 apparent illogic they felt was being pushed on them.

549

550 *“Interviewer: Do you think the idea of sustainable intensification is good?”*

551 *Respondent: I think you’ll find it to be competitive. I need to be the most intensive...”*

552

553 *“Interviewer: Thinking about the social elements now, would you say that an efficient farm is*
554 *producing more stock for less head of people? ...does that mean we have less social benefits?*

555 *Respondent: Yes exactly...Especially in livestock.*

556 *Another respondent: They want us to produce but they want us to really stand on our own.”*

557

558 *“Respondent: ...with the lack of staff now, the labour isn’t there to do lots of things that would*
559 *be good in terms of sustainability. It’s a double edged sword really, profitability.*

560 *Another respondent: Now the farmers are going out to work... there’s less people on farms.*

561 *On average there’s only three quarters of a person working, so the social thing...*

562 *You’re saving on labour but maybe your missing out on opportunities.”*

563

564 *“Interviewer: Collaboration for sustainable intensification, does it fit with us being a*
565 *competitive industry?*

566 *Respondent: Yes... we’ve got to help each other...whatever you do...*

567

568 Such concerns were not only expressed with respect to increasing competition in food
569 production, but even in relation to payments for environmental outputs. This was a point the
570 Fferm Ifan group noted, highlighting a concern that such payments (i.e. those that they were
571 receiving) were not necessarily accessible to all.

572

573 *You're separating farmers out [...] If you can't get into [the paid environmental schemes]*
574 *people are going to be left behind again and there'll be people saying why can't I get that and*
575 *why are they getting that? We have to live with those people every day (Fferm Ifan Farmer 9)*
576

577 This issue has similarly been echoed by the farm unions in response to continued refinements
578 in the targeting of Welsh agri-environmental schemes over the last ten years, meaning that
579 fewer farmers receive payments, undermining the (in many ways unintended) social benefit
580 that payments previously provided (Wynne-Jones and Vetter 2018). As such, we see social
581 sustainability coming under threat from both a focus on production efficacies and narrower
582 targeting of environmental outcomes.

583

584 **5. Concluding Discussion**

585 This paper has presented evidence on the following points, which are addressed in turn through
586 this concluding discussion:

- 587 (1) The extent forms and preferences associated with farmers' collaboration.
588 (2) The underpinning and mutually reinforcing role of social interconnectedness in the delivery
589 of diverse outcomes from collaboration.
590 (3) How SI is perceived to threaten social sustainability.

591

592 **5.1 Collaboration**

593 The paper has worked from the starting point that collaboration has the potential to benefit SI,
594 following existing evidence of how desirable outcomes for production efficiency,
595 environmental enhancement and social support can be supported by working at scale and
596 enhancing interactions between farmers; as outlined in section 1. Our data collection and

analysis has sought to augment this literature by providing further insight on the experience and preferences that UK farmers currently hold with regards to collaboration, to determine whether there is scope (and a need) for further enhancement, and/or specific considerations to take into account.

Findings demonstrate higher levels of collaboration than anticipated reflecting a wide range of activities, extending beyond previous counts of formalised cooperative membership (discussed in section 2), and with a particular emphasis on informal interactions. Overall, this shows that willingness, social norms and practical experience are present, providing a basis for collaborations going forwards. This is positive news that we should work from and share, both to address recent concerns regarding declining collaborative capacity raised in the literature (Emery 2015; Emery et al. 2017) and to counter the negative perceptions that some respondents felt external stakeholders held (noted in section 4.1). These findings also show the benefit of more expansive reporting in terms of what counts as collaboration, which could strengthen insights internationally.

In terms of specific alignment with SI the mix of activities reported suggest a range of appropriate skills and outcomes to be taken forwards, mapping onto the types of benefits and processes noted in section 1. These include practices to support efficiencies through economies of scale and innovation such as producer/buyer/discussion groups and labour/resource sharing, which also have relevance for enhancement of farmer wellbeing and cultural renewal (discussed further below), as well as enabling environmental improvements. Some experience of collaborative environmental working was shown across all areas, with prevalence in the Conwy area encouragingly aligning with policy agendas for upland farms (Griffiths 2018).

The emphasis on informal working evidenced was broadly championed as a central component of productive community relations, both indicating and reproducing the necessary inclination and qualities amongst farmers to achieve efficiencies from labour and equipment sharing. Some considerations can, however, be noted. For example, collaborating as part of an environmental scheme or making collective investments in new technologies (activities that clearly serve the imperatives of SI) can require more formalised legal and financial structures and processes. This point was acknowledged by respondents, but smaller upland farms (typical in the Conwy area) were seen to be least comfortable and experienced in this regard and may require additional support or incentives to engage in this type of working.

5.2 Social Interconnections

Further exploring farmers' preferences and motivations, the underpinning role of social interconnectedness has been highlighted as a key enabler and driver of farmers' collaboration, particularly so for more informal practices. Our findings therefore demonstrate that not only are more farmers collaborating than expected but that this is underpinned by a strong sense of mutual interdependence. These insights support existing data on successful group working (Prager 2015; Tregear and Cooper 2017) but show how widespread these dynamics are across farming communities, beyond the bounds of known cooperatives. This was notably so amongst upland producers in the Conwy area, where a strong sense of community and socio-economic interdependency act as important determinants.

Critically this interconnection appears to work as a reinforcing process, i.e. the more farmers collaborate, the greater their social bond and willingness to work together further. Taking this one step further, the Conwy farmers expressed a desire to collaborate to actively sustain their collective business viability, so that sufficient farms could continue to exist to maintain this

positive community dynamic. Notably data presented in this regard related to both informal and formal forms of collaboration, delivering on both production and environmental outcomes. As such, we contend that collaboration (for diverse ends) both requires and enables social sustainability, conceptualised here as continuing community viability and the resulting connectivity, trust and commitment that farmers expressed to this cause. This indicates complimentary interactions between the social, economic and environmental dimensions of SI, which echo findings from research elsewhere whereby farmer groups have realised a series of interconnecting benefits from collaboration acting in a reinforcing cycle (Wynne-Jones 2017).

These synergies are particularly notable from an SI perspective given that some key outcomes are not necessarily being pursued by respondents in an isolated or individuated manner. Achievement of environmental outcomes are a case in point, where respondents' motivations to collaborate for primarily environmental ends was very low (as reported in section 4.1). But the more reassuring figures on uptake of environmental activities seem to be underpinned by a combination of the financial reward and social commitment that can be achieved in group settings (see also Emery et al. 2017; Forney 2016).

Similarly, enhancements in knowledge exchange were not always anticipated or pursued as a primary rationale for collaborating in the first instance, but emerged from the more informal processes of 'lending a hand' and associated interactions. These findings connect with the literature on peer-to-peer learning and how this helps expose farmers to new ideas and evaluate their own practice (Schneider et al 2009; Šūmane et al 2018). Whilst not countering the need for fresh ideas to challenge a sometimes conservative impetus or norming pressures in closed groups (Tregear and Cooper 2016), the implicitly localised focus of discussions on what practices suit the farm fit well with calls for more geographically sensitive approaches to SI

(Gunton et al. 2016; Scherer et al. 2018). Equally, a strong peer network can support the development of adaptive management, with co-learning and action research (Eriksen and Selboe 2012). This is particularly important for upland farms where the greatest gains for SI may be attained by focusing on the basics of practice (i.e. soil nutrient management), rather than seeking to invest in more techno-centric approaches (Gibbons et al. 2014).

5.3 Social Sustainability

In light of the potential for the multiple gains detailed, we caution that maintaining social sustainability is critical to support farmers' capacity to work together for such ends. Our data shows some difficulties arising from reduced labour availability (concurring with Eriksen and Selboe 2012). Most worryingly, we outline how farmers in the Conwy associate SI with a competitive impetus, potentially undermining collaborative capacity by reducing conviviality and exacerbating the reduction of farm workers (and farms in general) in a drive for efficiency. As such, we caution that whilst collaboration can certainly work to support SI, the reverse may not necessarily be true.

These concerns connect to wider arguments (explored in section 2) that position SI as a productivist agenda, centred foremost on intensification. But the farmers' contentions suggest that it is not only environmental objectives that are in danger of being marginalised if narrower interpretations of SI are pursued. There are social dis-benefits which can arise if production efficiencies are taken as the primary objective above all else. These points build on Loos et al. (2014) to provide an expanded understanding of the role social sustainability within SI. Whilst research and policy advocacy have begun to connect to questions of wellbeing and poverty as part of an expanded social agenda for SI (Garnett et al. 2013), this paper deepens insights on the connections between agricultural viability and community resilience, which have largely

697 been side-stepped in SI forums. Loos et al. (2014) draw attention to pressures for intensification
698 that can marginalise and dispossess poorer farmers in the Global South. Our findings point to
699 the consequences of similar pressures across Europe.

701 This connects with undeniably political questions over the future of rural livelihoods and the
702 contested rationales for farm subsidies and rural payment schemes here. Willingness to provide
703 social welfare and community supports as a component of farm policy has come under
704 increasing scrutiny across the UK (Potter and Wolf 2014) with notably fraught discussions
705 emerging in areas of marginalised agriculture and consequently higher vulnerability like Wales
706 (Wynne-Jones and Vetter 2018). This is particularly so now in the face of Brexit (Dwyer 2018).
707 Although some concession to the predicament of rural communities is apparent in Wales
708 (Griffiths 2018; WG 2018), policy aspirations for efficiencies that result in winners and losers
709 inevitably threaten social sustainability.

711 Past discussion of such threats in the European context often revolves around the unique
712 cultural value of small family farms and the landscapes they maintain (Ray 1998). We offer a
713 different perspective here in connecting to the SI agenda and the dynamics of collaboration, by
714 demonstrating that social protections are not separate from the attainment of production
715 innovations and environmental enhancements. This potentially reworks long acknowledged
716 understandings of multi-functionality within EU policy, where farm supports have been
717 maintained on the grounds of interconnections between the socio-cultural, environmental and
718 productive dimensions (Potter and Tilzey 2005). Whilst the championing of ‘multi-
719 functionality’ has been critiqued as a bifurcated strategy (Rønningen and Flemsæter 2016),
720 producing a divided farm landscape of ‘intensive’ and ‘traditional’ producers, greater
721 appreciation of the inter-connections between SI outcomes could help us to move beyond this.

Unpicking these forms of connectivity could also speak to calls for a more substantive rethink of the framings that SI is advancing (Rockström et al. 2017). As such our findings both confirm a need for food security researchers to better engage with the tensions and imperatives of social sustainability, but also to ensure that a genuinely integrated conception of SI is pursued moving forwards.

Acronyms

SI Sustainable Intensification

SIP Sustainable Intensification Platform

Defra Department for Environment, Food and Rural Affairs

LFA Less Favoured Area

Bibliography

Agra CEAS Consulting (2019) Social Contribution of Agriculture: An Evidence Review. Report for Welsh Government.

Armstrong, E. (2016) Research Briefing: The Farming Sector in Wales. National Assembly for Wales Research Service. Available online:

<http://www.assembly.wales/research%20documents/16-053-farming-sector-in-wales/16-053-web-english2.pdf> [last accessed 26/9/19]

Baulcombe, D., Crute, I., Davies, B., Dunwell, J., Gale, M., Jones, J., Pretty, J., Sutherland, W., Toulmin, C. (2009) Reaping the Benefits: Science and the Sustainable Intensification of Global Agriculture. (London: Royal Society).

745 Beilin, R., Lindborg, R., Stenseke, M., Pereira, H.M., Llausàs, A., Slätmo, E., Cerqueira, Y.,
 746 Navarro, L., Rodrigues, P., Reichelt, N. and Munro, N. (2014) Analysing how drivers of
 747 agricultural land abandonment affect biodiversity and cultural landscapes using case studies
 748 from Scandinavia, Iberia and Oceania. *Land Use Policy* 36 pp.60-72

749 Bijman, J., Iliopoulos, C., Poppe, K.J., Gijssels, C., Hagedorn, K., Hanisch, M., van der
 750 Sangen, G. (2012) Support for Farmers' Co-operatives. (Brussels: Final Report European
 751 Commission)

752 Bijman, J. and Iliopoulos, C. (2014) Farmers' Cooperatives in the EU: policies, strategies,
 753 and organization. *Annals of Public and Cooperative Economics* 85(4) pp.497-508

754 Cogeca (2013) Development of agricultural cooperatives in the EU 2014. Available online
 755 [http://zadruga.coop/upload_data/site_files/development-of-agricultural-cooperatives-in-the-](http://zadruga.coop/upload_data/site_files/development-of-agricultural-cooperatives-in-the-eu_2014.pdf)
 756 [eu_2014.pdf](http://zadruga.coop/upload_data/site_files/development-of-agricultural-cooperatives-in-the-eu_2014.pdf) [last accessed 26/9/19]

757 Dias, C. and Franco, M. (2018) Cooperation in tradition or tradition in cooperation?
 758 Networks of agricultural entrepreneurs. *Land Use Policy* 71 pp.36-48

759 Dwyer, J.C. (2018) The Implications of Brexit for Agriculture, Rural Areas and Land Use in
 760 Wales. Public Policy Institute for Wales. [https://www.wcpp.org.uk/wp-](https://www.wcpp.org.uk/wp-content/uploads/2018/04/The-Implications-of-Brexit-for-Agriculture-Rural-Areas-and-Land-Use-in-Wales-1.pdf)
 761 [content/uploads/2018/04/The-Implications-of-Brexit-for-Agriculture-Rural-Areas-and-Land-](https://www.wcpp.org.uk/wp-content/uploads/2018/04/The-Implications-of-Brexit-for-Agriculture-Rural-Areas-and-Land-Use-in-Wales-1.pdf)
 762 [Use-in-Wales-1.pdf](https://www.wcpp.org.uk/wp-content/uploads/2018/04/The-Implications-of-Brexit-for-Agriculture-Rural-Areas-and-Land-Use-in-Wales-1.pdf) [last accessed 26/9/19]

763 EC (2013) How many people work in agriculture in the European Union? EU Agricultural
 764 Economics Briefs No 8 Available online:
 765 [https://ec.europa.eu/agriculture/sites/agriculture/files/rural-area-](https://ec.europa.eu/agriculture/sites/agriculture/files/rural-area-economics/briefs/pdf/08_en.pdf)
 766 [economics/briefs/pdf/08_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/rural-area-economics/briefs/pdf/08_en.pdf) [last accessed 26/9/19]

767 Emery, S.B. (2015) Independence and individualism: conflated values in farmer cooperation?
 768 Agriculture and Human Values 32(1) pp.47-61

769 Emery, S.B., Forney, J. and Wynne-Jones, S. (2017) The more-than-economic dimensions of
 770 cooperation in food production. Journal of Rural Studies 53 pp. 229-235

771 Eriksen, S. and Selboe, E. (2012) The social organisation of adaptation to climate variability
 772 and global change: The case of a mountain farming community in Norway. Applied
 773 Geography 33 pp.159-167

774 FAO (2011) Save and grow: a policymaker's guide to the sustainable intensification of
 775 smallholder crop production. (Rome: FAO)

776 Fish, R., Lobley, M. and Winter, M. (2013) A license to produce? Farmer interpretations of
 777 the new food security agenda. Journal of Rural Studies 29 pp.40-49

778 Fish R, Winter M, and Lobley M. (2014) Sustainable intensification and ecosystem services:
 779 new directions in agricultural governance. Policy Sciences 47 pp. 51–67

780 Fish, R. (2017) Farmer Discussion Groups – Key Findings (WP 2.3A Task 4) SIP Project 2:
 781 Opportunities and Risks for Farming and the Environment at Landscape Scales (LM0302).
 782 Report to DEFRA. Available online at:
 783 [http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Proje](http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18803&FromSearch=Y&Publisher=1&SearchText=sustainable%20intensification&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description)
 784 [ctID=18803&FromSearch=Y&Publisher=1&SearchText=sustainable%20intensification&Sor](http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18803&FromSearch=Y&Publisher=1&SearchText=sustainable%20intensification&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description)
 785 [tString=ProjectCode&SortOrder=Asc&Paging=10#Description](http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18803&FromSearch=Y&Publisher=1&SearchText=sustainable%20intensification&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description) [last accessed 26/9/19]

786 Fonte, M. and Cucco, I. (2017) Cooperatives and alternative food networks in Italy. The long
 787 road towards a social economy in agriculture. Journal of Rural Studies 53 pp.291-302

788 Forney, J. (2016) Blind spots in agri-environmental governance: some reflections and
789 suggestions from Switzerland. *Review of Agricultural, Food and Environmental Studies*
790 97(1) pp.1-13

791 Forney, J. and Häberli, I. (2017) Co-operative values beyond hybridity: The case of farmers’
792 organisations in the Swiss dairy sector. *Journal of Rural Studies* 53 pp.236-246

793 Foresight (2011) The future of food and farming: challenges and choices for global
794 sustainability. Final project report. (London: The Government Office for Science)

795 Franks, J.R. and Emery, S.B. (2013) Incentivising collaborative conservation: Lessons from
796 existing environmental Stewardship Scheme options. *Land Use Policy* 30(1) pp.847-862

797 Garnett, T., Appleby, M.C., Balmford, A., Bateman, I.J., Benton, T.G., Bloomer, P.,
798 Burlingame, B., Dawkins, M., Dolan, L., Fraser, D. and Herrero, M. (2013) Sustainable
799 intensification in agriculture: premises and policies. *Science* 341(6141) pp.33-34.

800 Garnett, T. and Godfray, C. (2012) Sustainable intensification in agriculture. Navigating a
801 course through competing food system priorities. Food climate research network and the
802 Oxford Martin programme on the future of food. (UK: University of Oxford)

803 Gibbons, J.M., Williamson, J.C., Williams, A.P., Withers, P.J., Hockley, N., Harris, I.M.,
804 Hughes, J.W., Taylor, R.L., Jones, D.L. and Healey, J.R. (2014) Sustainable nutrient
805 management at field, farm and regional level: Soil testing, nutrient budgets and the trade-off
806 between lime application and greenhouse gas emissions. *Agriculture, Ecosystems &*
807 *Environment* 188 pp.48-56

808 Godfray, H.C.J. and Garnett, T. (2014) Food security and sustainable intensification.
809 *Philosophical Transactions of the Royal Society B* 369(1639) p.20120273

810 Gonzalez, R.A. (2017) Going back to go forwards? From multi-stakeholder cooperatives to
811 Open Cooperatives in food and farming. *Journal of Rural Studies* 53 pp.278-290

812 Gove, M. (2018) A Brighter Future for Farming. Secretary of State Michael Gove speech at
813 NFU Farming Conference February 20th 2018 Available online:
814 <https://www.gov.uk/government/speeches/a-brighter-future-for-farming> [last accessed
815 26/9/19]

816 Griffiths, L. (2018) Written Statement - Future of agriculture and land management. Lesley
817 Griffiths, Cabinet Secretary for Energy, Planning and Rural Affairs 21 March 2018.
818 Available online:
819 <http://gov.wales/about/cabinet/cabinetstatements/2018/landmanagement/?lang=en> [last
820 accessed 26/9/19]

821 Gunton, R.M., Firbank, L.G., Inman, A., Winter, D.M. (2016) How scalable is sustainable
822 intensification? *Nature Plants* 2 (16065) pp.10-1038.

823 Joosse, S. and Grubbström, A. (2017) Continuity in farming - Not just family business.
824 *Journal of Rural Studies* 50 pp.198-208

825 Källström, H.N. and Ljung, M. (2005) Social sustainability and collaborative learning.
826 *AMBIO: A Journal of the Human Environment* 34(4) pp.376-382

827 Kasabov, E. (2015) Investigating difficulties and failure in early-stage rural cooperatives
828 through a social capital lens. *European Urban and Regional Studies* 23(4) pp.895-916

829 Lang T and Barling D. 2012. Food security and food sustainability: reformulating the debate.
830 *Geographical Journal* 178 pp.313–26

831 Lawton, J., Brotherton, P., Brown, V., Elphick, C., Fitter, A., Forshaw, F., Haddow, R.,
832 Hilborne, S. Leafe, R., Mace, G. (2010) Making Space for Nature: a review of England's
833 wildlife sites and ecological network. Report to Defra.

834 Levidow, L. (2018) Sustainable intensification: agroecological appropriation or contestation?
835 In: Constance, Douglas H.; Konefal, Jason T. and Hatanaka, Maki eds. Contested
836 Sustainability Discourses in the Agrifood System. Earthscan Food and Agriculture. (London:
837 Routledge/Earthscan)

838 Loos, J., Abson, D.J., Chappell, M.J., Hanspach, J., Mikulcak, F., Tichit, M. and Fischer, J.,
839 (2014) Putting meaning back into “sustainable intensification”. *Frontiers in Ecology and the*
840 *Environment* 12(6) pp.356-361

841 Mahon, N., Crute, I., Simmons, E. and Islam, M.M., 2017. Sustainable intensification–
842 “oxymoron” or “third-way”? A systematic review. *Ecological Indicators* 74 pp.73-97

843 McManus, P., Walmsley, J., Argent, N., Baum, S., Bourke, L., Martin, J., Pritchard, B. and
844 Sorensen, T. (2012) Rural Community and Rural Resilience: What is important to farmers in
845 keeping their country towns alive? *Journal of Rural Studies* 28(1) pp.20-29

846 Mills, J., Gibbon, D., Ingram, J., Reed, M., Short, C., Dwyer, J. (2011) Organising collective
847 action for effective environmental management and social learning in Wales. *Journal of*
848 *Agricultural Education and Extension* 17 (1) 69-83

849 Morris, C., Jarrett, S., Lobley, M., Wheeler, R. (2017) Baseline Farm Survey – Final Report
850 (WP 2.2A Task 2). SIP Project 2: Opportunities and Risks for Farming and the Environment
851 at Landscape Scales (LM0302). Report to DEFRA. Available online at:
852 <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Proje>

853 [ctID=18803&FromSearch=Y&Publisher=1&SearchText=sustainable%20intensification&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description](https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/articles/labourintheagricultureindustry/2018-02-06) [last accessed 26/9/19]

854

855 Moschitz, H., Roep, D., Brunori, G., Tisenkopfs, T. (2015) Learning and Innovation

856 Networks for Sustainable Agriculture: Processes of Co-evolution, Joint Reflection and

857 Facilitation. *The Journal of Agricultural Education and Extension*. 21(1) pp. 1-11

858 ONS (2018) Labour in the agriculture industry, UK. Available Online:

859 <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/articles/labourintheagricultureindustry/2018-02-06> [last accessed 26/9/19]

860

861 Potter, C. and Tilzey, M. (2005) Agricultural policy discourses in the European post-Fordist

862 transition: neoliberalism, neomercantilism and multifunctionality. *Progress in Human*

863 *Geography* 29(5) pp.581-600

864 Potter, C.A. and Wolf, S.A., (2014) Payments for ecosystem services in relation to US and

865 UK agri-environmental policy: disruptive neoliberal innovation or hybrid policy adaptation?.

866 *Agriculture and Human Values* 31(3) pp.397-408

867 Prager, K., Reed, M. and Scott, A. (2012) Encouraging collaboration for the provision of

868 ecosystem services at a landscape scale—rethinking agri-environmental payments. *Land Use*

869 *Policy* 29(1) pp.244-249

870 Prager, K. (2015) Agri-environmental collaboratives for landscape management in Europe.

871 *Current Opinion in Environmental Sustainability* 12 pp.59-66

872 Ray, C. (1998) Culture, intellectual property and territorial rural development *Sociologia*

873 *Ruralis* 38 pp. 3-20

874 Rockström, J., Williams, J., Daily, G., Noble, A., Matthews, N., Gordon, L., Wetterstrand,
875 H., DeClerck, F., Shah, M., Steduto, P. and de Fraiture, C., 2017. Sustainable intensification
876 of agriculture for human prosperity and global sustainability. *Ambio* 46(1) pp.4-17

877 Rønningen, K. and Flemsæter, F., (2016) Multifunctionality, Rural Diversification and the
878 Unsettling of Rural Land Use Systems. *International Handbook of Rural Studies*, p.312.
879 (London: Routledge)

880 Saxby, H., Gkartzios, M. and Scott, K. (2018) 'Farming on the Edge': Wellbeing and
881 Participation in Agri-Environmental Schemes. *Sociologia Ruralis* 58(2) pp.392-411

882 Scherer, L.A., Verburg, P.H. and Schulp, C.J.E. (2018) Opportunities for sustainable
883 intensification in European agriculture. *Global Environmental Change* 48 pp.43-55

884 Schneider, F., Fry, P., Ledermann, T. and Rist, S. (2009) Social learning processes in Swiss
885 soil protection—the 'from farmer-to farmer'project. *Human Ecology* 37(4) pp.475-489

886 Shreck, A., Getz, C. and Feenstra, G. (2006) Social sustainability, farm labor, and organic
887 agriculture: Findings from an exploratory analysis. *Agriculture and Human Values* 23(4)
888 pp.439-449

889 Spyridakis, M. and Dima, F. (2017) Reinventing traditions: Socially produced goods in
890 Eastern Crete during economic crisis. *Journal of Rural Studies* 53 pp.269-277

891 Stallman, H.R. (2011) Ecosystem services in agriculture: determining suitability for provision
892 by collective management. *Ecological Economics* 71 pp.131-139

893 Suhardiman, D., Giordano, M., Leebouapao, L. and Keovilignavong, O. (2016) Farmers'
894 strategies as building block for rethinking sustainable intensification. *Agriculture and Human*
895 *Values* 33(3) pp.563-574.

896 Šūmane, S., Kunda, I., Knickel, K., Strauss, A., Tisenkopfs, T., des Ios Rios, I., Rivera, M.,
897 Chebach, T. and Ashkenazy, A. (2018) Local and farmers' knowledge matters! How
898 integrating informal and formal knowledge enhances sustainable and resilient agriculture.
899 *Journal of Rural Studies* 59 pp.232-241

900 Tregear, A. and Cooper, S. (2016) Embeddedness, social capital and learning in rural areas:
901 The case of producer cooperatives. *Journal of Rural Studies* 44 pp.101-110

902 Weltin, M., Zasada, I., Piorr, A., Debolini, M., Geniaux, G., Perez, O.M., Scherer, L., Marco,
903 L.T. and Schulp, C.J. (2018) Conceptualising fields of action for sustainable intensification–
904 A systematic literature review and application to regional case studies. *Agriculture,*
905 *Ecosystems & Environment* 257 pp.68-80

906 Westerink, J., Jongeneel, R., Polman, N., Prager, K., Franks, J., Dupraz, P. and
907 Mettepenningen, E. (2017) Collaborative governance arrangements to deliver spatially
908 coordinated agri-environmental management. *Land Use Policy* 69 pp.176-192

909 WG [Welsh Government] (2018) Brexit and Our Land. Welsh Government Consultation
910 Document. Available online: [https://beta.gov.wales/sites/default/files/consultations/2018-](https://beta.gov.wales/sites/default/files/consultations/2018-07/brexit-and-our-land-consultation-document_0.pdf)
911 [07/brexit-and-our-land-consultation-document_0.pdf](https://beta.gov.wales/sites/default/files/consultations/2018-07/brexit-and-our-land-consultation-document_0.pdf) [last accessed 26/9/19]

912 Wheeler, R. Morris, C. Lobley, M. and Winter, M. (2018) “The good guys are doing it
 913 anyway”: the accommodation of environmental concern among English and Welsh farmers.
 914 Environment and Planning E 1(4) pp.664-687

915 WRO [Wales Rural Observatory] (2013) An analysis of the socio-economic impact of CAP
 916 reforms on rural wales. Report for Welsh Government. Available online:
 917 [http://www.walesruralobservatory.org.uk/sites/default/files/An%20Analysis%20of%20the%20](http://www.walesruralobservatory.org.uk/sites/default/files/An%20Analysis%20of%20the%20Socio-)
 918 [Socio-](http://www.walesruralobservatory.org.uk/sites/default/files/An%20Analysis%20of%20the%20Socio-)
 919 [Economic%20Impact%20of%20CAP%20Reformson%20Rural%20Wales%20Phase%203%20](http://www.walesruralobservatory.org.uk/sites/default/files/An%20Analysis%20of%20the%20Socio-)
 920 [C%204%20and%205%20Report.pdf](http://www.walesruralobservatory.org.uk/sites/default/files/An%20Analysis%20of%20the%20Socio-) [last accessed 26/9/19]

921 Wynne-Jones, S. (2017) Understanding farmer co-operation: Exploring practices of social
 922 relatedness and emergent affects. Journal of Rural Studies 53 pp.259-268

923 Wynne-Jones S., Thomas, A., Scarlett, P., Williamson, J., Marshall, M., Vincent, H.,
 924 Edwards, F., Pagella, T. Williams, P., and Chadwick, D. (2017) Conwy Area Case Study:
 925 Lessons learned for developing Sustainable Intensification in agriculturally marginal
 926 landscapes. (WP 2.2B) SIP Project 2: Opportunities and Risks for Farming and the
 927 Environment at Landscape Scales (LM0302). Report to Defra

928 Wynne-Jones, S. and Vetter, T. (2018) Assembling Payments for Ecosystem Services in
 929 Wales Chapter in Forney, J., Rosin, C., and Campbell, H. eds. Agri-environmental
 930 governance as an assemblage: multiplicity, power, and transformation. (London: Routledge,
 931 Earthscan)

932

933 **Tables**

934 **Table 1: Respondent frequencies by age, farm size and farm type (adapted from**
 935 **Wheeler et al. 2018)**

936

Participant age		Farm size		Farm type	
Under 45	30	Small (<50ha)	39	LFA grazing livestock	71
45-54	71	Medium (50-99ha)	41	Cereals	62
55-64	76	Large (100-199ha)	64	Lowland grazing livestock	59
65 +	64	Very large (200-499ha)	66	Dairy	18
Missing Data	3	Ultra Large (500ha +)	33	Mixed	17
		Missing Data	1	General cropping	16
				Missing Data	1
Total	244		244		244

937

938 **Table 2:** Farmers' main reasons for collaborating, and the main benefits derived (modified
939 from Morris et al 2017)

Factor	% of all respondent s reporting factor as a motivation	% of Conwy area farmers reporting factor as a motivatio n	% of all respondent s reporting factor as a benefit	% of Conwy area farmers reportin g factor as a benefit
Economic				
Costs/prices/income/efficiency/profit	48	46	52	34
Access to resources – Labour/land/sires/grazing/stores)	26	14	32	17
Environmental	5	0	3	0
Social				
Bargaining power – influence	4	9	2	6
Knowledge exchange / social learning	13	3	25	34
Mutual support/ Neighbourliness/Community/	27	26	28	37

ⁱ See <http://www.siplatform.org.uk/what-si> [last accessed 26/9/19]

ⁱⁱ See <http://www.siplatform.org.uk/farming-collaboration> [last accessed 26/9/19]

ⁱⁱⁱ In the research reported on here we asked farmers about *cooperation* and *joint working*, although we use the term *collaboration* in the paper as a more encompassing term. Further detail on, and our rationale for, the different forms of collaborative work included in the research is outlined in the methods.

^{iv} [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Share_of_the_labour_force_directly_working_on_farms,_by_economic_size_of_farm,_2013_\(%25_of_total_AWUs\).png](http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Share_of_the_labour_force_directly_working_on_farms,_by_economic_size_of_farm,_2013_(%25_of_total_AWUs).png) [last accessed 26/9/19]

^v For example, whilst an average 40% of agricultural produce came to market across Europe through cooperatives in 2012, in the UK this was only 25% (Bijman and Iliopoulos 2014). Data compiled by Cogeca, for 2013, also shows that UK cooperative turnover is half the average for the EU 28 (Cogeca 2013, p23).

^{vi} Cooperatives UK report 416 agricultural cooperatives, involving 134,566 workers, in 2016. The ONS reported the UK's agricultural labour force to be 346,000 in 2015-16. See <https://www.uk.coop/agri/uks-agricultural-co-operative-sector> [last accessed 26/9/19]

^{vii} As the list of 'SI activities' they were asked about did not include any specifically collaborative practices our discussion here focuses instead upon the survey responses which do pertain directly to collaboration. 'Sustainable intensification' was not pre-defined in the survey, and farmers' asked instead for their own interpretations.

^{viii} Respondents were sent an opt-out letter giving five working days to opt-out of further contact. They were then invited to participate via telephone until the target of 35 for each area was reached.

^{ix} Respondents were asked "Are you involved, either formally or informally, in any of the following forms of cooperation/joint working with other farmers?" and then a pre-defined list read out. Farmers were given the option to add additional activities not included on the given list. The response of 'Do not regard as cooperation/joint working' was an option alongside 'currently involved', 'previously involved', 'considering involvement'.

^x With regards to SI, farmers were given a narrative written from the perspective of the Defra Chief Scientist. Entitled 'Rising to the challenge of Sustainable Intensification,' the narrative positions SI as a broad societal challenge framed around meeting global demand for food whilst minimizing environmental impacts.

^{xi} See

<http://gov.wales/topics/environmentcountryside/farmingandcountryside/cap/ruraldevelopment/wales-rural-development-programme-2014-2020/sustainable-management-scheme/?lang=en> [last accessed 26/9/19]

^{xii} In the European Union, less-favoured area (LFA) is a term used to describe an area with natural handicaps (lack of water, climate, short crop season and tendencies of depopulation), or that is mountainous or hilly, as defined by its altitude and slope.

^{xiii} Whilst machinery sharing can be done through formalised 'rings', their numbers have waned in recent years (see <https://www.fwi.co.uk/business/how-healthy-are-the-uk-s-machinery-rings> [last accessed 26/9/19]). The reporting here suggests that many farmers are continuing to share machinery on a more ad-hoc and less formalised manner.

^{xiv} We attained data on farmers' motivations and the benefits perceived from collaboration through open response questions. These data were then coded into key themes arising and grouped as either social, economic or environmental. Respondents could raise more than one factor.

^{xv} It is beyond the scope of this paper to consider all the trends in the data but see Morris et al. 2017 for more comprehensive reporting.

^{xvi} Farmers were asked for the main enablers for co-operation. Their responses were analysed and assigned to categories: organisation and governance, social factors and economic factors. Farmers could mention more than one theme.